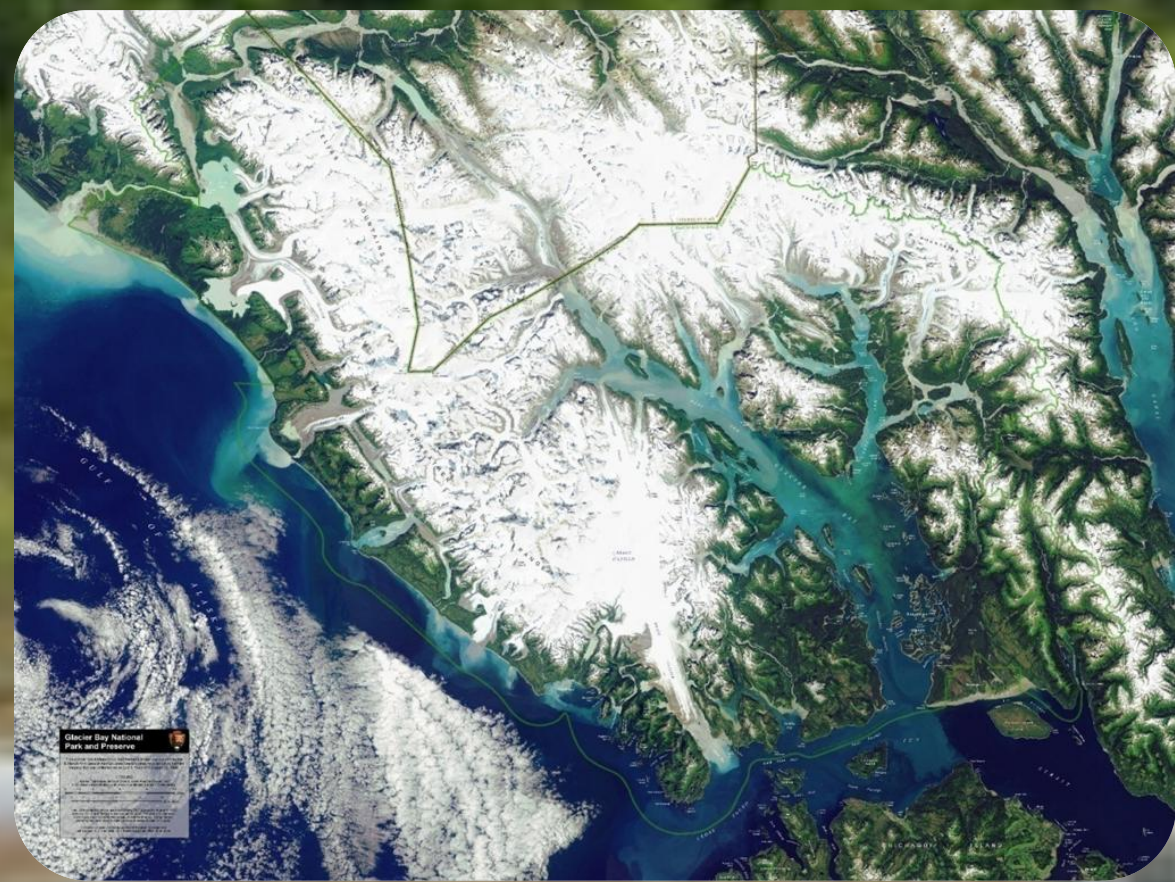# THE EFFECTS OF VESSEL-BASED BEAR VIEWING ON THE BEHAVIOR OF BROWN BEARS IN GLACIER BAY, ALASKA: PRELIMINARY RESULTS

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Glacier Bay National Park, Alaska

Introduction:

Wildlife viewing is a popular recreational activity in Glacier Bay where the vast majority of visitors travel and view wildlife in motorized vessels. In the recently de-glaciated fjords of Glacier Bay where glaciers and steep rock walls predominate, brown bears are particularly dependent on the marine intertidal zone and adjacent strips of beach meadow. Brown bears are of particular management concern because of their reliance on coastal habitats as well as the potential threat they pose to human visitors. A two year study beginning in 2009 examines the effects of vessel based bear-viewing on the behavior of brown bears on the shoreline using controlled experimental vessel approaches to bears. The results of this study will be used to establish bear viewing distances and/or regulations for vessels to minimize bear disturbance and displacement.

Methods: Experimental Approaches

- Locate brown bears from a mid-size (20-50 feet) motor vessel.
- Observe the bear at 400-500 meters and document the bear's initial behavior.
- Approach the bear at a direct bearing and slow (1-3 knots) speed.
- Record instantaneous behavioral observations and associated covariates every 3 seconds.
- Determine distance from vessel to bear at every behavioral obs. with Leica Geovid laser range finders.
- Attempt to take photos of all bears for photo ID to prevent approaching the same bear more than once per sampling period.
- If the bear is disturbed, the boat retreats.
- If the bear is not disturbed, the boat retreats after reaching its closest point of contact.

Disturbance defined as:

- The bear runs away from the boat, or
- The bear increases distance from boat in association with one or more stress behaviors.

Behavior Categories:

Energetic Gain: foraging (actively feeding and/or visually searching for food), and resting (standing, sitting, or lying down).

Movement: walking (direction recorded), running, swimming, and departing into cover

Stress: vigilant towards vessel, running away, posturing, and mouthing (jawing, yawning, or frothing).

Unknown: vigilant towards other, urinating, defecating, sniffing, playing, and interacting with another bear.
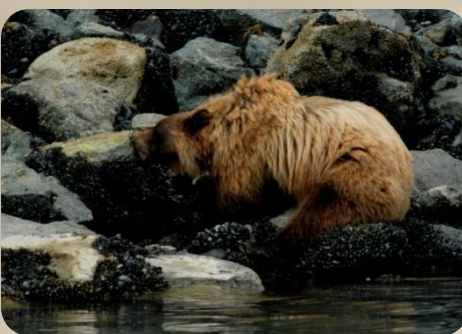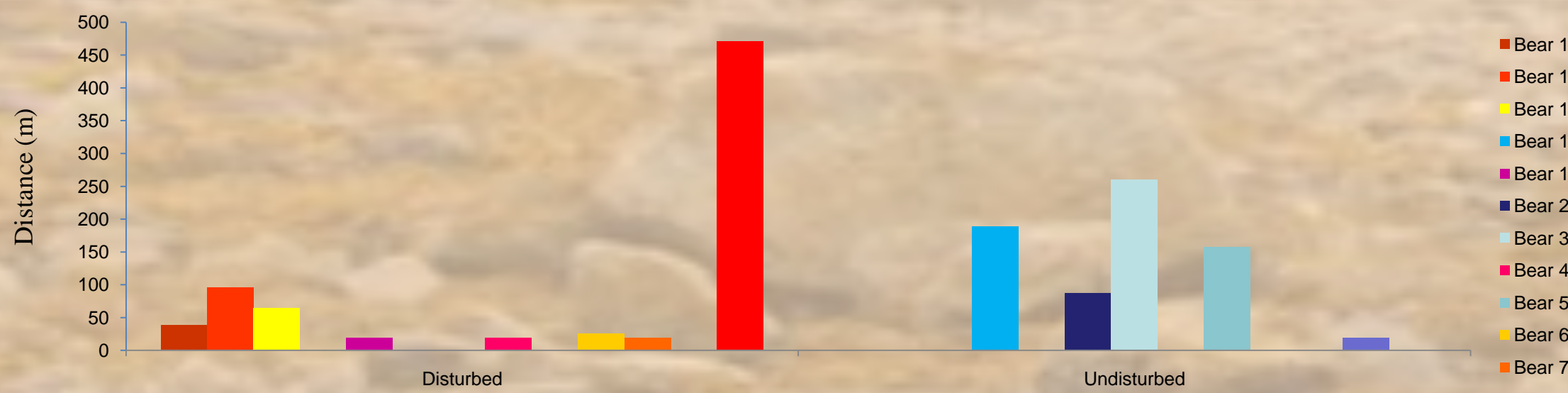
Preliminary Results

In 2009 we conducted thirteen experimental vessel approaches of brown bears.

Disturbance

Bears were disturbed in 8 out of 13 approaches at distances ranging from <20m to 421m. Seven out of 9 bears (78%) approached within 100m were disturbed. Sample size is likely too small at present to fit an accurate logistic regression model.

Closest approach distances of each bear and consequent disturbance or non-disturbance.

Energetic Gain and Stress Behaviors

Mean frequency bears spent exhibiting energetic gain behaviors decreased from 0.66 ± 0.15 at 401-500 meters to 0.40 ± 0.12 at 1-100 meters. Mean frequency bears spent exhibiting energetic gain behaviors increased from 0.11 ± 0.11 at 401-500 meters to 0.27 ± 0.06 at 1-100 meters.
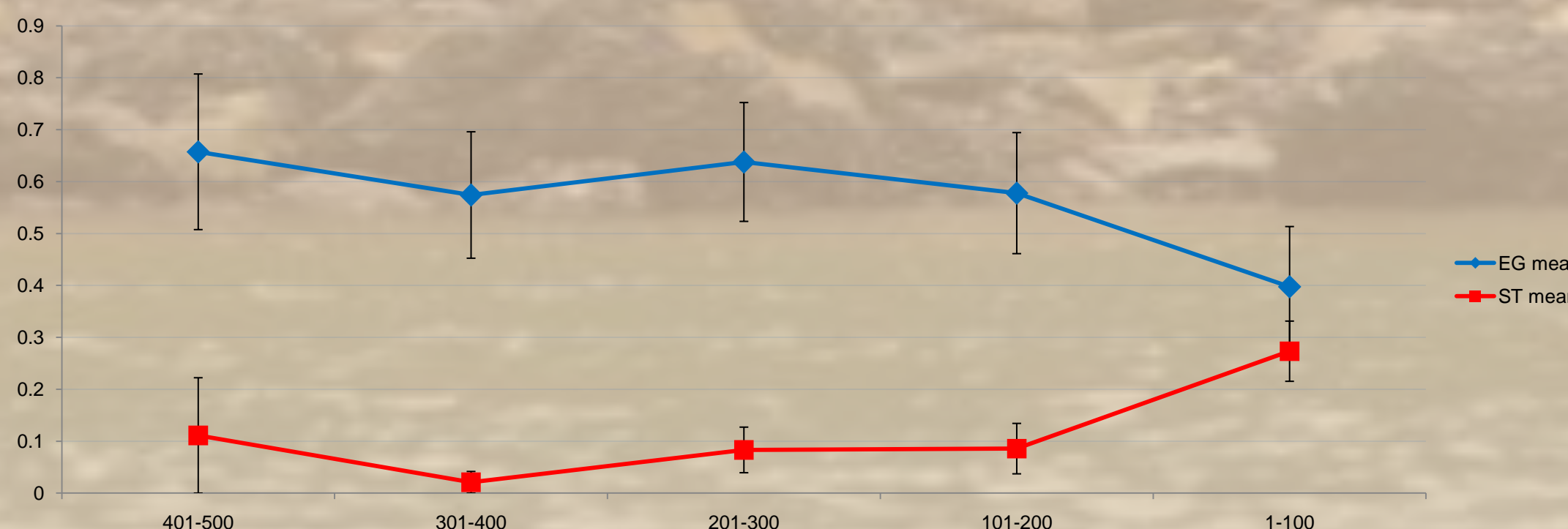
Mean frequency bears exhibited energetic gain (EG - blue) and stress behaviors(ST - red) across distance classes with standard error bars.

Discussion

Bears exhibited disturbance behavior more frequently when we approached within 100 meters. There appears to be a positive correlation between vessel distance and proportion of time that bears spend exhibiting energetic gain behaviors and an inverse correlation between vessel distance and time exhibiting stress behaviors. More trials are necessary to balance the data and decrease the variance.

Further analysis:
- Repeat measures ANOVA examining effects of boat distance on bear behavior,
- Logistic regression model examining effects of boat distance on bear disturbance,
- The effects of wind direction and boat behavior on bear disturbance,
- The relationship between direction of bears' movement and boat distance,
- Seasonal changes in bears' response to vessel approach.

Management Recommendations

At the end of this study, the following will be presented to the National Park Service:

- Minimum recommended approach distances,
- Bear viewing guidelines to minimize bear disturbance during vessel-based bear viewing.